

REMARKS

The specification claims have been amended to conform the original translated specification and claims to U.S. requirements, i.e., appropriate section headers are added, reference in the specification to the claims have been amended in order to eliminate multiple dependent claims and claims improperly depending from multiple dependent claims, and to otherwise conform the claims to U.S. practice. Care has been taken to ensure that no new matter is added to the text.

Applicants note that in the parent application the claim corresponding to above claim 20 was rejected under 35 U.S.C. §102(e) as anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Matyjaszewski et al (U.S. 5,807,937).

According to the Examiner, Matyjaszewski discloses a method of making graft polymers by living (controlled) ATRP polymerization process (abstract, Fig. 1). Thus, Matyjaszewski's invention further concerns a method of preparing a graft or "comb" (co) polymer, which includes the ATRP process.

Therefore, the steps of the process for production of polymers systems by living polymerization are fulfilled by Matyjaszewski.

Even if the reference to Matyjaszewski is removed from the scope of §102(e) rejection, a person skilled in the art would have found it obvious that the process described by Matyjaszewski, which steps commensurate in scope with those instantly claimed would have produced the instantly claimed

"layer or layers" of polymers on a substrate with the reasonable expectation of success.

Applicants respectfully traverse.

The present invention begins with and builds upon the state of the art as represented by Matyjaszewski. What Applicants have invented is to graft solid substrates of either inorganic or organic origin by applying ATRP in a process in which a) an initiator is bound to the solid and b) then ATRP grafting is initiated from the solid substrate surface.

As recited in present independent claims 17 and 18, the present invention concerns a process for production of layers or layer systems of polymers and/or oligomers on a solid substrate surface.

The invention includes the step of binding onto a solid substrate surface (a) an initiator which includes a group I for initiation of a reaction which proceeds according to an ATRP-mechanism, or (b) an initiator which serves as initiation site for polymerization the initiator includes a group I for initiating a reaction which proceeds according to an ATRP-mechanism, and wherein the reaction conditions are so selected, that the reaction proceeds according to the ATRP-mechanism. Independent claims 23, 24 and 25 similarly require the combination of solid substrates and ATRP-mechanism.

U.S. Patent No. 5,807,937, in comparison, contains the following teaching:

1. In columns 1 to 6 line 2 a listing is given of all known procedures to conduct living radical polymerizations as well as the synthesis of hyperbranched polymers.

2. In column 6 line 3 to column 7 line 21 a description is given of this new method of synthesizing polymers by use of the specified kind of living radical polymerization; therein column 7 lines 3 to 16 describe the initiating system necessary to conduct ATRP, comprising an initiator having a radically transferrable atom or group, and in column 7 line 3 to column line 20, the chemical conditions for the interplay of initiator, transition metal, a redox conjugate, and a ligand necessary to conduct ATRP.

3. In column 6 lines 30 to 36 graft (co)polymers bound to solid materials are not mentioned. Instead we read "... and topologies (block, graft, star, dendritic or hyperbranched, comb, etc)", though it should be noted that "graft" in the preceding text describes "graft polymers" which expressly means grafts without a solid material as the graft substrate. In U.S. patent No. 5,807,937, "grafts" are polymer chains bound to a polymer backbone, not polymers chains bound to a solid substrate.

4. In Fig. 1 and in column 7 lines 23 to 67 there is no illustration and no description of polymer chains grafted to a solid substrate.

5. In columns 8 to 39 line 49 all systems are listed which are covered by this invention. By doing so, especially in column 9 line 51 to column 10 line 51 nine topics are enumerated by which this invention is covered and described. In none of these points is graft (co)polymers bound to a solid substrate discernibly mentioned. Again, Applicants point out that in point

five reference is given to Fig. 1 in which graft (co)polymers bound to a solid surface definitely are not described.

6. In column 14 line 35, again, only the expressions "graft" and "comb" are used which definitely means "graft (co)polymer" and "comb (co)polymers", respectively, in the vocabulary of polymer sciences; polymer chains of this shape or molecular architecture bound to a solid substrate definitely are not described or even thought of.

7. In column 14 line 42 to column 17 line 3 the monomers are described which are suitable for the conduction of ATRP.

8. In column 17 line 4 to column 18 line 28 a description of the initiators is given which are suitable for initiating ATRP. Not a single word contains a hint that the ATRP initiator can be bound to the surface of a solid substrate.

9. In column 18 lines 29 to 56 the transition metals are listed suitable for ATRP.

10. In column 18 line 57 to column 20 line 54 the possible ligands are described.

11. In column 20 line 55 to column 21 line 43 the molar ratios for conducting ATRP are described.

12. In column 21 line 44 to column 22 line 54 possible solvents and polymerization temperatures are described.

13. In column 22 line 55 to column 39 line 45 a multitude of (co)polymers which can be synthesized is given. All these (co)polymers mentioned here are linear or branched, soluble individual molecules and cross-linked polymers. Definitely, in no case (co)polymers described which are grafted to the surface of a solid substrate. The "graft, comb or hyperbranched

copolymers" mentioned in column 28 line 45/46 are not bound to a solid substrate, and they can not be understood as "graft, comb or hyperbranched copolymers" the branching of which is caused because of their binding state on the solid substrate.

14. In column 31 line 40 to column 32 line 10 "star" polymers and copolymers are described as they can be synthesized via a multifunctional initiator. This multifunctional initiator is an individual, organic molecule, not a multifunctional solid substrate.

15. With respect to "hyperbranched" polymers, in column 35 line 64 to column 37 line 58 it is described that already existent polymers can be grafted (which in the vocabulary of polymers sciences is called "grafting-onto"). There is no description either of grafting of solid substrates (grafting-from) nor any grafting-from process with solid materials as the grafting substrate.

16. In column 39 lines 38 to 43, a variety of possible molecular topologies is described, but again, there is no hint about polymers grafted on a solid substrate.

17. In the 35 disclosed experimental examples in column 39 line 50 to column 60 line 30, no example is given for the grafting-onto or grafting-from the surface of a solid substrate, nor is even the possibility of doing so mentioned.

18. None of the 24 claims contains any hint that a solid substrate can be used.

19. In claim 6 column 61 lines 6 to 65, only inorganic heteroatoms (such as Si, or P) are mentioned which are incorporated in a defined organic molecule. On no account

inorganic or organic solid substrates are mentioned to carry the initiator.

20. In claim 9 column 63 lines 9 to 12 a (co)polymer macroinitiator is named which definitely is not a solid *expressis verbis*, the synthesis of which is claim 10.

Taking into consideration the above listed 20 points, one can only come to the conclusion that:

1. U.S. patent No. 5,807,937, Matyjaszewski et al describe ATRP polymerization reactions by which graft (co)polymers and comb (co)polymers can be made. All these polymers are exclusively individual organic, soluble polymers or cross-linked organic polymers.

2. In U.S. patent No. 5,807,937, ATRP graft (co)polymerization reaction either onto or from the surface of a solid substrate are not mentioned or even taken into consideration.

3. The person of ordinary skill can only concede that the present patent application represents an advance over the state of the art as represented by U.S. patent No. 5,807,937 ("Process Based on Atom (or Group) Transfer Radical Polymerization and Novel (Co)Polymers Having Useful Structures and Properties") to K. Matyjaszewski et al.

Accordingly, the present invention is neither anticipated by nor obvious over Matyjaszewski et al.

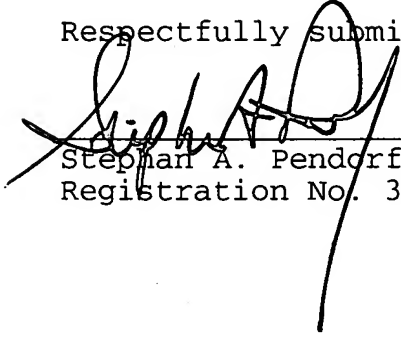
U.S. Application No.:
PRELIMINARY AMENDMENT

Attorney Docket: 3968.098

Entry and favorable consideration are respectfully requested.

Respectfully submitted,

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